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Electronic Readers Versus Printed Material – An Ecological Comparison

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Abstract

With accelerating adaptation rates of technological devices, the benefit of electronics in our society has been under scrutiny for some time. People want to know how much are these advancements truly going to benefit the environment instead of harming it as previous practices have done? This study set out to research the current trend of Electronic Readers, also known as E-readers, by comparing them to already established concerns with printed material.

This report was written in order to expose truthfulness in regards to the E-readers' footprint on the environment and the current inadequacies found in observation of practices offered for their recycling.

In order to deliver this information concerning E-readers' environment friendliness and recyclability issues, a variety of research methods were implemented. Along with data collected from previous sources confirming their findings, questions were posed to a broad group of E-reader users, ranging from students to retired professionals.

Research concluded that determining the ecological footprint of an E-reader is based on an individual's usage rate and the importance of the technology in his or her life. Also, findings confirmed that the devices' recycling practices are widely unknown to the public, and as a result confirm the need for change. With the use of descriptive research, surveys, and content analysis, this study explored the ways in which E-readers exemplify both pros and cons against print, and the need for awareness in regards to recycling and the benefits of re-use.

Chapter I - Introduction & Purpose of Study

Quite rapidly, current trends are shifting such that peoples' desire to consume information digitally has become overwhelmingly more popular than previous practices. The public is now trending towards receiving all of its visual, audible, and intellectual stimulation through their "hand-held" devices. Aside from cell phones and iPods, which have been deemed necessities for living, electronic readers (E-readers) are on the rise as the new household essential. These apparatuses now have the capability to hold 3,500+ digital book copies, giving its reader the ability to access almost all titles they desire in one immediate location. Although this convenience is highly preferred in peoples' fast-paced lifestyles, the technologies' ecological footprint now requires research. This study answers the following question: By conducting an ecological comparison of the two, how do E-readers, in terms of natural resource consumption and recyclability, compare to print?

Printed-paper has created a concern with people by way of deforestation, air and water pollution for years. With electronic resource consumption however, many are interested in the ways in which we are now harming the environment digitally. More recently, the issues surrounding a products recyclability and waste management system have become an added trepidation. Fortunately, the processes involved in recycling paper are very successful, and are what make up for the areas in which printed material is not so "green." On the other hand, at the rate of disposal for technological devices, finding ways in which to care for waste consumption is becoming increasingly more problematic. Although moderately high-priced, E-readers are being remodeled in quick succession, making prior editions less desirable, and in consequence more regularly disposed. The discarding of E-readers would not be so damaging, if they could be

as efficiently reclaimed as printed material. Since a safe and suitable practice has not yet been implemented, the main recycling activity they share in common is the act of passing a used book or E-reader down to a family member or friend. Also, if payment for the device is desired it could be sold, keeping the device active. If these paths are not taken however, consumers have basically two alternatives when ready to dispose of their E-readers. First off, one can send their E-reader back to the company from which they purchased it, or to a third-party waste management corporation. Most often times though, if not always, the electronic devices are sent to China or other developing countries where workers dispose of them by hand. Not only is this practice harmful to the unprotected people performing these services, but also the products being disassembled result in hidden toxins polluting the atmosphere and water. The alternative to this, which is just as unacceptable, is throwing the E-readers in a landfill, once again endangering the earth with harmful chemicals. Since these devices are non-biodegradable, they sit virtually forever, gradually poisoning the dumpsite.

Undeniably, the future can be foreseen as becoming nothing but increasingly more technologically progressive. Researchers are now becoming readily aware of the resource consumption used to create E-readers, and how they measure up to print. In terms of device replacement, the rate of speed in which electronic practices are superseding standard ones, calls for attention in regard to the ways in which these electronic instruments can be handled after use. Since the trend of E-readers is continually growing, it is no doubt their waste production will continue to increase. By monitoring the building of and current disposal practices used for E-readers, this study will identify the inadequacies in comparison to printed material, and find ways in which these practices could be altered or changed for the future. The purpose of this study therefore, is to discover and examine how people currently are and will utilize these devices in

order to expose their possible shortfalls. It will do so by incorporating the life cycle analysis of both E-readers and print, along with observing the effect of personal usage frequencies. The life cycle examination includes, but is not limited to, energy consumption during the building and usage stages of each, a greenhouse gas emissions comparison, and how the two are handled after use.

Chapter II - Literature Review

In the midst of digital readers being on the forefront of our societies' technological craving, many industry professionals and independent researchers are formulating their opinions of these new devices and their true benefits. Typically most are in favor of an E-reader's easy-to-use interface and interactive software; yet in terms of their impact on the environment, recognize significant problems. With a thriving demand becoming rapidly apparent, researchers studying the effect of electronics on our land have projected a negative trend in terms of resources used for the devices and how they are being disposed. Examining these against practices already set in place for print, the two offer their comparisons.

Before delving into the impact E-readers have on our land and resources, most researchers focus on a devices' rate of growth in popularity. With more people purchasing digital readers, the more reason for concern in terms of their sustainability. Sales of E-books are rapidly increasing, as are the number of devices capable of displaying them (Environmental Impact of E-Books). Since Amazon released their Kindle in November of 2007, sales have escalated exceptionally, resulting in more companies releasing similar devices. Although the Kindle leads the E-reader market, it is promptly losing market share to Apple's iPad. Yet, when combined, they make up a vast majority of the market. Other popular readers, such as the Sony Reader and Barnes and Noble's "Nook" make up only a small fraction of the remainder (Environmental Impact of E-Books, Green Press Initiative). In 2009, sales of E-readers totaled over \$169.5 million dollars. With the average E-reader costing \$200, this is roughly 847,500 E-readers. From January 2010 through August of 2010, sales persisted in such a way, that they increased 193 percent from that same period in 2009 (Environmental Impact of E-Books, Green Press

Initiative). Christmas holiday, 2010, consumer reports showed an increase in E-reader purchases from 4 percent in 2009 to 10 percent in people who were interviewed (Bosman). To test this apparent increase in popularity and sudden devotion to digital books, the BISG (Book Industry Study Group) conducted a survey entitled, "Survey of Consumer Attitudes Toward E-Book Reading." What they found suggests that a shift in how people choose to read books is on the rise. According to the study, which was released in January of 2010, roughly 1/5 of survey respondents said they've stopped purchasing print books within the past 12 months in favor of acquiring the e-book editions (Environmental Impact of E-Books, Green Press Initiative). The number of E-reader devotees is rising quite steadily, with e-book net sales increasing to 69.9 million dollars in January 2011 compared to the previous 32.4 million in January 2010. On the other end of the spectrum, hardcover sales dropped from 55.4 million dollars in January 2010 to 49.1 million in January 2011 (Kearney). With this being the case, the fact that E-readers are still a niche market needs to be taken into consideration. Readily compared to other digital devices, such as the MP3 player, the rate of adoption has not been as quick, given people generally listen to music more than they read (Ritch). However, according to Forrester Research analysis Sarah Rotman, price points for the devices will continue to drop steadily. This will make owning a device more attainable and appealing to potential customers. By 2012, it is predicted that some devices will be offered for purchase for as low as 99 dollars U.S. (Ritch).

Accompanying the thriving sales of E-readers, researchers are recognizing the significance of becoming attuned to the consumption of resources involved, especially in comparison to printed material. With paper, the industry is now well aware of the impact printing has on the environment. Results for E-readers, on the other hand, are not as easily discoverable since they are dependent on individual usage. Because of this, on a per book basis, a reader who

reads 100 books on an E-reader will have almost 1/100th of the impact of someone who reads only one book on the same device (Environmental Impact of E-Books, Green Press Initiative). With such obstacles set in place, the ways in which to assess these two are by observing their ecological footprint. By definition, the ecological footprint is a measure of human demand on the Earth's ecosystems. It compares human demand with planet Earth's ecological capacity to regenerate (Data Sources, Global Footprint Network). The first point of interest to analyze is the carbon footprint each process emits. By definition, a carbon footprint is “the total set of greenhouse gas (GHG) emissions caused by an organization, event, product or person” (Carbon Footprinting, Carbon Trust Home). According to the 'Environmental Trends and Climate Impacts: Findings from the U.S. Book Industry', harvesting of forests for paper share 62.7 percent of total carbon emissions, while paper production at mills share 22.4 percent. This clearly exemplifies that paper consumed for print is the main reason for the industry's carbon footprint of 12.4 million metric tons or 8.85 lbs. of carbon dioxide per book (Miller, Tyson, Eco-Libris). Juxtaposing this, Apple's report on its iPad determined that over its lifecycle, a single device will be responsible for 130 kg (287 lbs.) of carbon equivalent greenhouse gas emissions. As a result, an iPad owner will need to offset thirty-two and a quarter printed books during its lifetime in order to break even in terms of the carbon footprint of reading those books (Environmental Impact of E-Books, Green Press Initiative). Likewise, Amazon's Kindle has been discovered to produce 168 kg (370 lbs.) of carbon dioxide emissions over its lifetime. This ends up equaling the amount of emissions emitted of about forty-two paper books (Environmental Impact of E-Books, Green Press Initiative). Assessing these results it can be concluded that to be compared equal in terms of producing greenhouse gas emissions, an E-reader user must read

fifty to seventy e-books, which is the equivalent of reading thirty-two to forty-two printed books, on one device during its lifetime.

Alongside carbon emissions, water consumption is an extensive concern for both industries. The reason for water consumption in the creation of printed material is to make the pulp slurry that is pressed and heat-dried to make paper. Statistics conclude that to print one book with virgin pulp, seven gallons of water need to be used. With current trends however, books are more readily being printed with recycled pulp, in which only two gallons are necessary (Kate, Are E-readers Environmentally Friendlier Than Paper Books?). Although this is the case, the number of books printed with recycled pulp versus virgin pulp is nowhere near where it should be in terms of being environmentally friendly. According to the 2008 report 'Environmental Trends and Climate Impacts: Findings from the U.S. Book Industry', the percentage of recycled pulp being used to create books was between only 5 and 10 percent. This is an area in which the printing industry has great room for improvement, and according to a survey done in 2005, almost 80 percent of responders were willing to pay up to a dollar more for books printed on recycled paper (Eco-Libris.) E-readers, on the other hand, take an average of 79 gallons of water to be produced. This water usage is a result of creating an E-reader's batteries, printed wiring boards, and refined metals found in the circuits (Daniel Goleman and Gregory Norris, How Green Is My iPad?). In comparison to printing with virgin pulp, this ultimately sets upon the duty of an E-reader owner to read at least 12 books over a device's lifetime for it to become more efficient in regard to water consumption. Authors and researchers Goleman and Norris summed these effects up clearly when they stated, "With respect to fossil fuels, water use and mineral consumption, the impact of one e-reader payback equals roughly 40 to 50 books. When it comes to global warming, though, it's 100 books; with human health consequences, it's

somewhere in between.” (Daniel Goleman and Gregory Norris, How Green Is My iPad?)

Considering results of both practices are dependent upon individual user methods, comparisons can be carefully drawn, yet the full effects of these electronic devices on our overall well-being are perpetually being determined.

Lastly, looking at post-production energy consumption of E-readers is critically important. Unlike printed material, E-readers inevitably require energy consumption during the “use” stage of their lifecycle. Although this number is considerably less than the amount of energy used to produce the device, it is still worth noting. As an example, Apple's iPad consumer energy is equivalent to 30% of its total carbon footprint. This number can fluctuate, however, due to an E-reader's e-ink technology and battery life during use. Some of the E-readers are designed with e-ink that allows for energy consumption only when the words on the page change. The comparison to print most frequently given is the amount of energy it takes to read an E-reader versus the amount of energy it takes from having a light on while reading a book (Environmental Impact of E-Books.) With little research completed on this aspect of the issue however, energy consumption during an E-readers lifespan is without a doubt a problem, yet its size is still unknown.

In sequence with being produced, after a printed piece or E-reader is used to the owner's content, it must be properly disposed of. Analyzed first, printed material, if recycled correctly, is very effective in terms of its sustainability. Companies selling E-readers, on the opposite end, have not determined the best solution for discarding and reclaiming their devices.

The implementation of recycling paper for reuse has been in high regard for quite some time. The process has been established as guidelines to the proper handling of paper in order to

conserve energy and materials used. Once paper is collected, it is transported to a recycling center where it is wrapped up into tight bales and sent to paper mills. From there, the paper is put into a pulper, which contains water and chemicals. This mixture, combined with heat, turns the paper into small strands resulting in what is called pulp. The pulp is then sent through systematic cleaning, de-inking, bleaching, and color stripping. After these processes are complete, the clean pulp is mixed again with water and chemicals to make it 99.5 percent water. Finally, it is sent through a series of rollers to squeeze out the water, and a final set that are heated, to dry the resulting paper. This method is proven exceptionally acceptable, resulting in 80 percent of the content of recycled paper actually being used in the recycling process. The remaining 20 percent however is not, because staples, plastic, and other trash must be eliminated during pulping. Individual researchers supported by 'The Leading Technical Association for the Worldwide Pulp, Paper and Converting Industry', have found that Americans recover nearly fifty percent of all the paper they use. (How Is Paper Recycled?, TAPPI)

E-reader recovery has taken a much different approach than its counterpart print. Being a fairly new technology, practices for discarding these devices are continually being assessed and re-implemented in a means to try and find a most efficient way of disposing them. In 2007, Americans generated roughly 3 million tons of electronic waste, in which only 13.6 percent was recycled. The remaining 84 percent then went to landfills or was incinerated, which is not a safe practice, since chemicals leach out into the air, and earth's groundwater and streams.

In regard to recycling practices, companies are now at crossroads in determining what to do with discarded E-readers. According to the Electronic TakeBack Coalition, most recycling firms export instead of recycle. From 50 to 80 percent is shipped overseas for dismantling under

unsafe conditions (Raz Godelnik, Is E-Reading Really Greener?). This exploitation of electronic exporting is an alarming problem, yet has gone virtually unnoticed. In order for an E-reader to be safely disposed of, certain useful metals need to be extracted and discarded. Since the process of this is quite time consuming, American companies have grown accustomed to sending their E-waste abroad. This exported waste ends up in developing countries, such as China and Africa. In Guiyu, China, poor residents heat circuit boards over coal fires to recover lead, while others use acid to burn off pieces of gold. According to reports from the nearby Shantou University, Guiyu has the highest level of cancer causing dioxins in the world and elevated rates of miscarriage. The push to find a better alternative is slowly building a reputation. Without the help of the government though, “greener” mandatory recycling practices cannot be set in place. The U.S. is now the only industrialized country that has refused to ratify the 19-year-old Basil Convention, which was designed to regulate the export of hazardous waste to developing nations (Bryan Walsh, Time, E-Waste Not). In result of the lack of government rule, some companies have taken it upon themselves to make sure E-reader owners have a safe place to discard of their E-reader when finished. These companies are asking customers to sell them their devices in which they will then be re-implemented for another user. An example of this, <http://www.e-cycle.com/> buys back iPads and cell phones from its customers, and then resells them as means of recycling. Similar to this, <http://www.yourenew.com/> implements a user-friendly web interface that allows people to sell back multiple electronic items. The website has customers select an item in which one is looking to dispose of, and determines a price for it based on their conditions. If the potential customer is happy with this price, they ship the electronic to the company, and in return are paid. These used items are then reintroduced into the market as a method of recycling. Slowly, individuals and corporations are trying to shift the way in which consumers can dispose

of their electronics. E-readers, based on quick remodel rates, are gaining more attention as a probable concern of new E-waste being produced. Optimism is that our country will become more environmentally aware, resulting in suitable plans of disposal for these devices being better regulated to make sure they are being accurately implemented.

Unfortunately, most are unaware of recycling programs like the ones stated above, and in general are fairly unknowledgeable of recycling practices as a whole. As a result of this unawareness, massive amounts of electronics are incorrectly thrown away, ending up in incinerators and landfills. When this occurs, not only is the land compromised, but also workers and the community are exposed to toxic materials (Environmental Impact of E-Books, Green Press Initiative). According to the buyback recycling company E-cycle, “Inside every wireless device are enough toxic substances to pollute 40,000 gallons of water. In fact, smart phones and cell phones, along with other electronic waste, comprise 70% of toxic waste in landfills. These materials can harm the local environment and present health risks.”(E-cycle) In terms of E-readers, individually, studies are still being conducted in regard to the sustainable statistics of throwing them in landfills versus recycling. New devices are released rapidly, as often as weeks apart, resulting in the discarding of preceding editions concerning present researchers. In a study done in 2010 on Apple’s iPad, projected e-waste numbers were not satisfying. Morgan Stanley analyst Katy Huberty predicted that Apple’s iPad sales would reach ten million in 2010. In fact, Apple ended up selling fourteen million eight hundred thousand iPads in 2010, far exceeding anyone’s expectations. With the ten million marker in mind, at a recycling rate of even fifty percent, the iPad generates seven and a half million pounds of e-waste in the year (Raz Godelnik, How Green is Your iPad?). Being that number is extremely high, E-reader companies need to take notice and make sure they have proper waste management programs set in place for their

customers. In order to do so, companies may provide incentive programs for customers to return their old devices when they are ready for an upgrade (Raz Godelnik, How Green is Your iPad?). This could include a price discount on future products purchased or warranty guarantees. As a result of the mounting dilemma e-waste is burdening our ecosystem with, it is up to the companies, themselves, to take control of the requirements with which to handle their products after use.

A multitude of research has been done in order to express the pros and cons of E-readers versus print. With many findings from both sides, organizing a concrete comparison of the two becomes solely based on the individual usage consumers will get from the media. The more regular reader, using an E-reader, may surpass reading the amount of E-books yearly in order to qualify the products sustainability. Once finished, if it is recycled properly, possibly being sold back into market, the user can have overall acted in a green nature. Individual numbers are the best way in which to gather information regarding eco-friendly comparisons, which results in the need for answers to questions such as: Do you plan to purchase an E-reader? On average, how many books do you, or will you, read yearly? And lastly, would you recycle an old E-reader, when purchasing a new one, or were you not even aware of the ability to do so? The answers to these will help to provide insight for comparing E-readers vs. print on a larger scale.

Chapter III - Research Methods

Increased recognition of E-readers as an environmentally friendly substitute to reading print has resulted in assessing the connections concerning resource consumption and current disposal practices. Together, these issues provide core reasons as to why researchers are hesitant to give E-readers the title of being more eco-friendly. The purpose of this study, therefore, is to discover and examine how people will make, or are making, the most of these devices in order to expose possible inadequacies. To discover these answers descriptive research and content analysis have been used.

Using descriptive research, I have analyzed the results of a series of questions that were conducted to better understand the practicality and sustainability of E-readers. By definition, “descriptive research studies are designed to determine the nature of a situation as it exists at the time of the study.” (Levenson).

In order to successfully measure my results using the descriptive research method, I have conducted both electronic and physical surveys. First, I have created a survey in which I posed questions to both current E-reader users and potential ones. These surveys were presented online to Graphic Communication majors attending Cal Poly, San Luis Obispo, online relations, family members and friends. From fifty-eight survey responses, I have acquired answers pertaining to the following questions:

1. How many E-readers are in your household?

1. a) 0

2. b) 1

3. c) 2

4. d) 3+

2. If you do not own an E-reader, is it a future purchase?

1. a) Yes

2. b) No

3. c) Other, please specify

3. Currently owning an E-reader or not, how many would you expect to own in a 5 year period?

1. a) 0

2. b) 1

3. c) 2

4. d) 3+

4. If you already own one, how often is it used?

1. a) Daily

2. b) Weekly

3. c) Monthly

5. On average, how many books do you read a month?

1. a) 0

2. b) 1

3. c) 2

4. d) 3+

6. How about yearly?

1. a) 1 – 10

2. b) 11 – 20

3. c) 21 – 30

4. d) 31+

7. Are a majority of these texts read digitally or printed?

1. a) Digitally

2. b) Printed

8. If you own an E-reader, have you upgraded from a previous edition?

1. a) Yes

2. b) No

9. As a current or future owner, would you most likely upgrade when new editions became available?

1. a) Yes
2. b) No
3. c) I do not plan to own an E-reader

10. If you own or are planning to own an E-reader, would you, or have you, recycled it in order to upgrade?

1. a) Yes – I would or have recycled it.
2. b) No – I would or have thrown it away.
3. c) No – I would or have kept all prior editions.
4. d) Other, please specify.

11. Are you aware of the current recycling practices for E-readers?

1. a) Yes
2. b) No
3. c) Other

12. If you do not own an E-reader, would you be more likely to purchase a 'recycled' or new one?

1. a) Recycled

2. b) Brand New

3. c) Other

Along with conducting the survey, I have interviewed current E-reader users for content analysis to acquire a more in-depth knowledge on usage rates and plans for disposal. Content analysis is known as a methodology for studying the content of communication. It is a tool that is used for analyzing concepts within text (An Introduction to Content Analysis). In using this, these interviews have helped to expand on survey results and provide for clearer interpretation. I have conducted 5 of these interviews for explanation. Interviewees include E-reader users Professor Nancy Cullins, Professor Brian Lawler, Graphic Communication department administrative assistant Korla McFall, Diane McKeague, and Pat McKeague.

Information gathered from the individuals has been organized as such:

Do you plan on upgrading?				
If yes, would you be more likely to purchase a new E-reader or a re-used one? Why?				
Nancy Cullins	Brian Lawler	Korla McFall	Diane McKeague	Pat McKeague
How many books do you figure you've read on it?				
How long have you owned an E-reader?				
On average, how many books do you read yearly?				
How many do you own?				

Do you still read paper books in

conjunction with your E-reader?

If yes, why?

Have you recycled an E-reader yet?

Would you, if upgrading?

Results from survey responses and interviews have delivered beneficial answers for measuring E-Reader sustainability and waste management practices. Using this data, I have been able to record and assess individual usage rates in order to predict sustainability levels, and expose inadequacies in currently implemented recycling programs.

Chapter IV – Results

The online survey given out to people including Graphic Communication students at Cal Poly – San Luis Obispo, friends, and family members proved to exemplify the impact individual user usage rates have on the overall ecological footprint of an E-reader. *Figures 1-12* reiterate the questions asked in the survey, as well as provide corresponding visual results.

Figure 1: Survey responses to question number 1

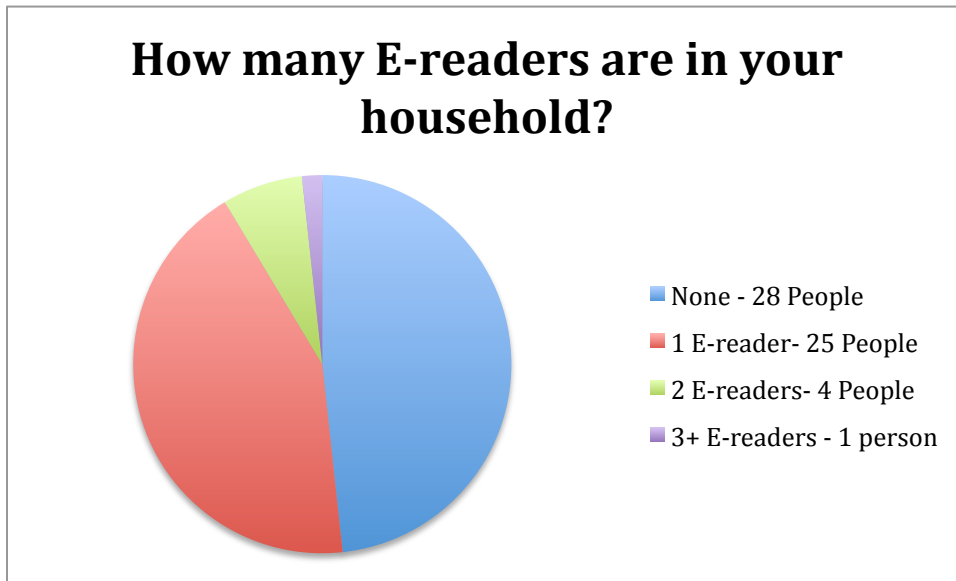


Figure 1 helps to determine how many of the individuals who took the survey currently own an E-reader. Results show that most of the people who took the survey own zero to one E-reader.

Figure 2: Survey responses from question number 2

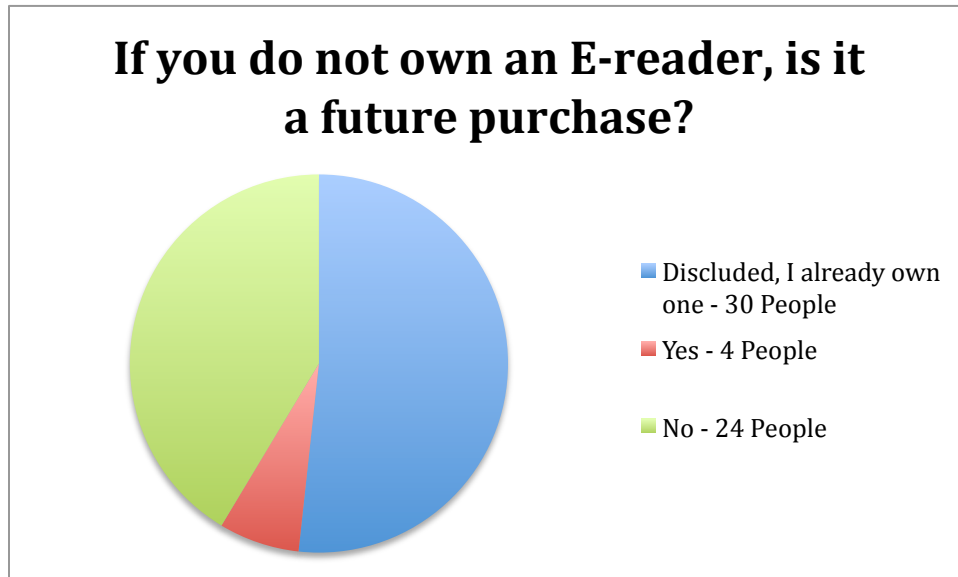


Figure 2 helps to show whether or not responders were interested in purchasing an E-reader if they did not already own one. The “other” refers to those who already own an E-reader, or plan to have one passed down to them. A factor that should be taken into consideration is that the predominate group of survey takers consisted of people in their early to mid twenties within the Graphic Communication major. This most likely influenced the outcome in such a way that responders, for the most part, cannot budget an E-reader into their lives, and as a result will not purchase one until later in life.

Figure 3: Survey responses from question number 3

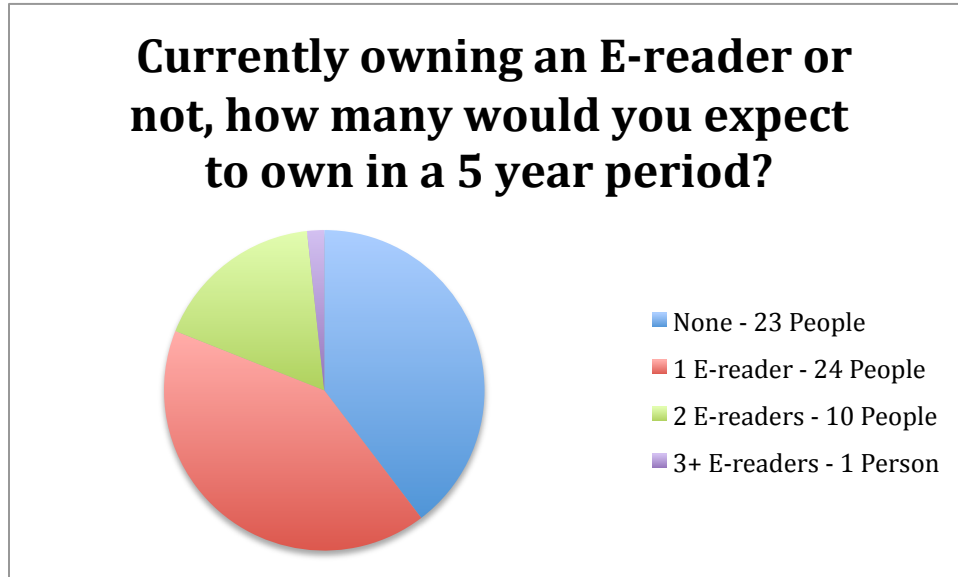


Figure 3 gives insight into the number of E-readers a person may own within a five-year period. The majority of people said they plan on owning only one, if any.

Figure 4: Survey responses to question number 4

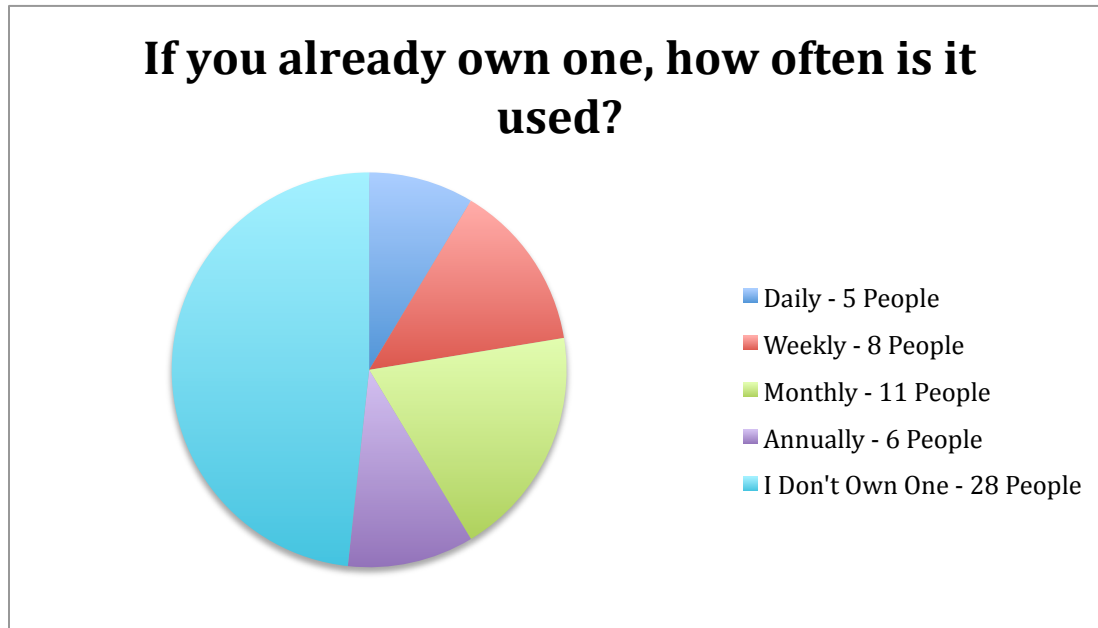


Figure 4 shows the possible issue that E-reader users predominately read on their devices less frequently than would be desired from a sustainability standpoint. That being said, E-readers will be more environmentally friendly if they are used on a regular basis. This regularity correlates with a greater number of books being read on a single device.

Figure 5: Survey responses to question number 5

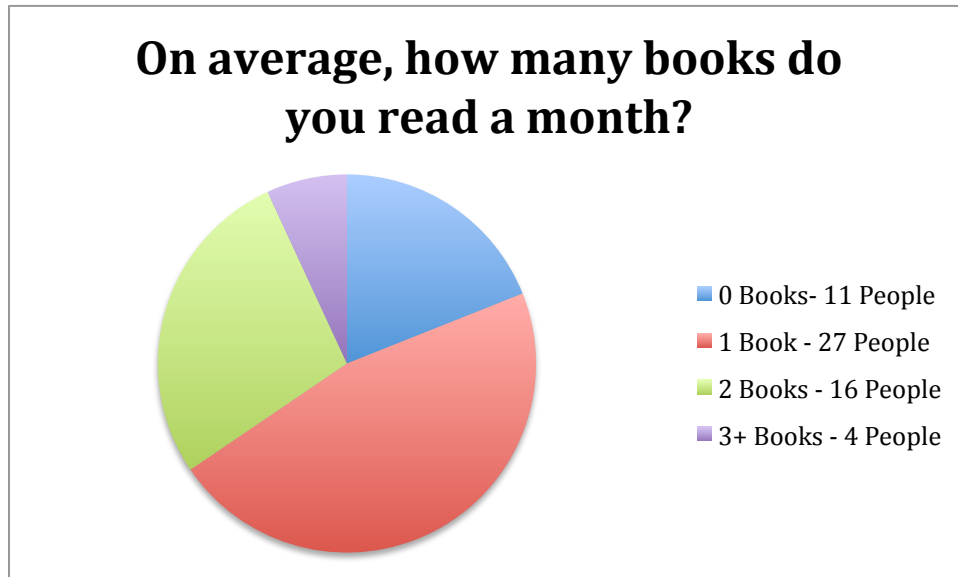


Figure 6: Survey responses to question number 6

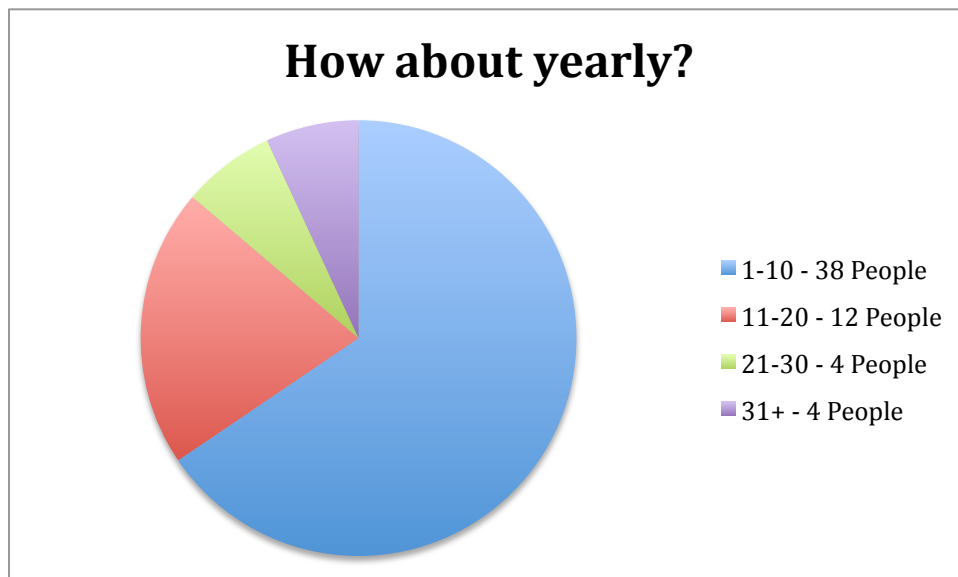
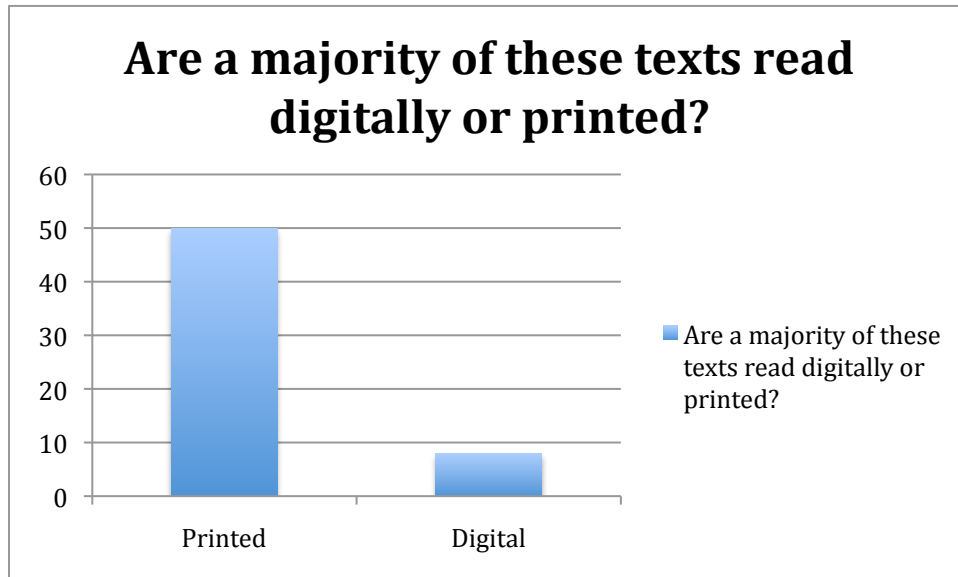


Figure 7: Survey responses to question number 7



Figures 5 & 6 represent the amount of books read monthly and annually by responders. Most people who answered read one to two books a month, and one to ten books a year. With this being said, fifty-one out of fifty-eight responders said they read these books in printed form, as can be seen in *Figure 7*. Since respondents are predominately Graphic Communication students, a larger sample size could present different responses. Yet with the technology still being new, this data can be taken as accurate. With the eight out of fifty-eight responders who read e-books, it is important to remember how many books they need to finish in order to equal the eco-friendliness of its competitor; print.

Figure 8: Survey responses to question number 8

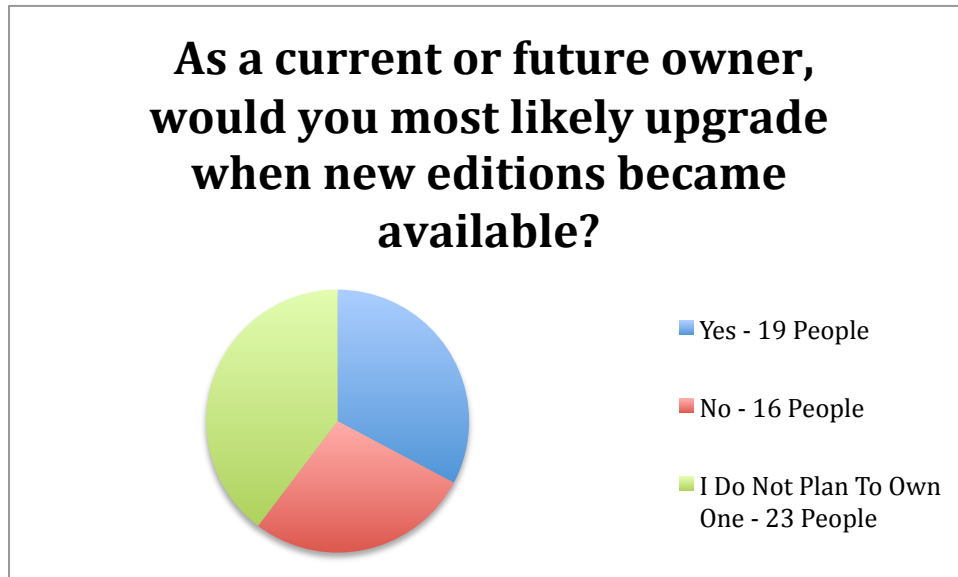


Figure 8 poses the question of whether or not a person would upgrade their E-reader when a new edition became available. The responses were split quite evenly, with nineteen saying “Yes”, sixteen saying “No”, and twenty-three saying “I do not plan on owning one”. Results such as these are accurate when thinking in terms of a “forecasting trends” graph in the sense that there are “Early Adopters” (Yes), “Late Majority” (No), and “Laggards” (I do not plan on owning one). With new technologies, people are either usually eager to own the newest version(s), or wait until they absolutely find a need for it. Keeping an E-reader for as long as possible is a more environmentally sustainable option, while frequent upgrading can lead to the underuse of the product.

Figure 9: Survey responses to question number 9

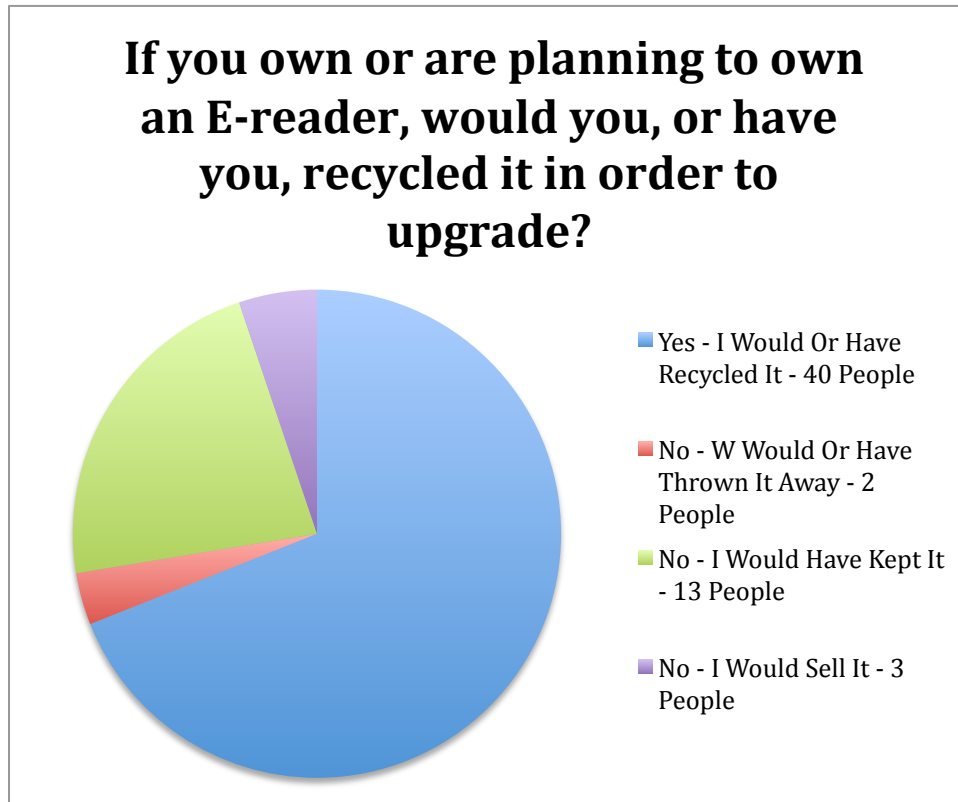
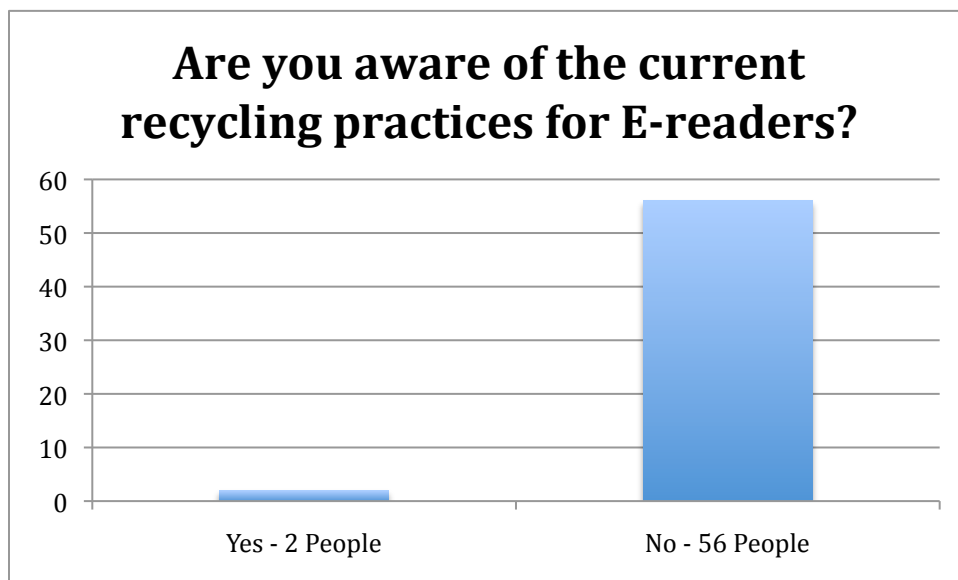


Figure 10: Survey responses to question number 10



Figures 9 and 10 exemplify peoples' recycling practices and overall knowledge of E-reader recyclability. Forty out of fifty-eight people said they would recycle their E-readers, yet fifty-five responded that they did not know how these products were recycled. This lack of knowledge is one reason for which unsafe recycling practices are so frequently used in the discarding of E-readers. It is the information that is withheld from the public that allows them to believe that sending these products to be "recycled" is an environmentally safe option, when in fact; it is generally the exact opposite.

Along with the survey results, the content analysis studies conducted with Nancy Cullins, Brian Lawler, and Korla McFall provided great insight into how usage rates can determine the sustainability of E-readers. Also, the interviews exposed how the current lack of media attention towards safe E-reader disposal practices have left people unaware of what to do with their used electronics, an increasingly growing problem for the United States.

Figure 11: Content analysis responses

1) How long have you owned an E-reader?

- **Nancy:** Over 7 years
- **Brian:** 4 years
- **Korla:** 4 years
- **Diane McKeague:** 4 years
- **Pat McKeague:** 4 years

2) How many do you own?

- **Nancy:** 3
- **Brian:** 2
- **Korla:** 2
- **Diane McKeague:** 1
- **Pat McKeague:** 1

3) Do you plan on upgrading, if you haven't already?

- **Nancy:** I just did, but I will likely upgrade again within the next few years (3-5).
- **Brian:** I just bought the iPad 2.
- **Korla:** I just purchased an iPad, and when my Kindle insurance runs out, I will get a new one.
- **Diane McKeague:** Not at the moment.
- **Pat McKeague:** Not at the moment.

4) If you do, would you be more likely to purchase a new E-reader or a re-used one?

- **Nancy:** I would purchase a new one.
- **Brian:** N/A
- **Korla:** I would purchase a new one.
- **Diane McKeague:** I would purchase a new one.
- **Pat McKeague:** I would purchase a new one.

5) Why?

- **Nancy:** Because my husband is crazy about the latest technology.
- **Brian:** N/A
- **Korla:** Because they can be insured if they break.
- **Diane McKeague:** Because the technology is so new.
- **Pat McKeague:** I wouldn't want problems from a re-furbished model.

6) How many books do you figure you've read on it?

- **Nancy:** In the last two weeks I have read 8 books on my e-reader. So all told (7 years-ish) I have probably read close to 500 books on my e-reader.
- **Brian:** I've read 2 novels.
- **Korla:** I read about ten books a month, mainly on the Kindle, so that is 120 books a year, and about 480 books over the past 4 years.
- **Diane McKeague:** About 6.
- **Pat McKeague:** About 6, as well.

7) On average, how many books do you read yearly?

- **Nancy:** About 200
- **Brian:** N/A
- **Korla:** Around 120
- **Diane McKeague:** 18
- **Pat McKeague:** 18

8) Do you still read paper books in conjunction to your E-reader?

- **Nancy:** Yes.
- **Brian:** Yes.
- **Korla:** Yes.
- **Diane McKeague:** Yes.
- **Pat McKeague:** Yes.

9) If yes, why?

- **Nancy:** I find they are less expensive and cause less eye fatigue, easier to navigate.
- **Brian:**
- **Korla:** Easier on the eyes, but I like the E-reader because they are easier to take with you
- **Diane McKeague:** I like the feel of holding a book.
- **Pat McKeague:** I really only like to use my E-reader while I'm traveling.

10) Have you recycled an E-reader yet?

- **Nancy:** Nope. I just stack them up. I've recycled phones that I've used as e-readers.
- **Brian:** No.
- **Korla:** I will be sending a Kindle back to Amazon for a one time accident replacement.
- **Diane McKeague:** No.
- **Pat McKeague:** No.

11) Would you, if upgrading?

- **Nancy:** Sure. I would recycle my old one now if I knew where to send it.
- **Brian:** Yes.
- **Korla:** Yes
- **Diane McKeague:** Yes.
- **Pat McKeague:** Yes.

Professor Cullin's E-reader usage is exceptionally high, thus making her devices more than equally comparable to print in terms of their ecological footprint. She reads about two hundred books annually, a combination of both e-books and print. With having read close to five hundred e-books in a total of seven years, she has averaged about seventy e-books a year, confirming the sustainability of the electronics. The main issue with her situation, which seems

to be a problem for most E-reader users, is determining what to do with an E-reader after it is no longer wanted. In speaking with Nancy, I discovered she was aware of places in which she could recycle her E-reader, but finding out where her products were actually going was still a mystery.

Professor Lawler, on the other hand, shares his household E-readers, a Kindle and iPad, with his wife Ashala, who is more apt to using them. He has only read two novels on his devices, although he says his wife reads from them every night. We discussed the pros and cons pertaining to both the iPad and Kindle in terms of their features and environmental impact. In doing so, he informed me that to the best of his knowledge, Apple has set-up safe, fair trade factories in which the iPads are assembled in and are routinely checked on for safe practice of workers. He did not have similar information in regards to the Kindle, but after the interview, I tried contacting Amazon.com for a comparison. The call was short lived however, because they promptly told me they were not able to reveal information regarding the construction or recycling programs set in place for the Kindle. They informed me they were just the distributor, and to go on their website for all information. Lastly, I discussed recycling practices with Professor Lawler to see if he knew of the issues currently being debated. He told me he was aware that unsafe practices were being conducted, and that he had seen pictures of people from third world countries stripping electronics in front of their homes. Following this, he mentioned that countries in which actions like these are taking place, like China for instance, should have stricter government regulations in order to cut down on these harmful practices.

Korla McFall, much like Professor Cullins, has become an avid E-reader enthusiast. Currently she is reading approximately ten books a month, mainly on her Kindle, which results in her averaging around one hundred and twenty books a year. She is exceeding the requirements set in place in order to qualify her E-readers' sustainability in comparison to print. Although she

does enjoy her Kindle for its lightweight packaging and ease of usability, she still enjoys reading printed books in conjunction. She finds reading printed books are easier for her to do at home, yet during traveling or at school, she prefers using an E-reader. Unlike the two previous interviews, Mrs. McFall is planning on recycling an E-reader due to the fact that it got damaged. With her Kindle insurance policy she is able to return her E-reader, if damaged, for a new one. She is unsure of what the company will do with her E-reader once they receive it. All she has been told is that they will have her ship the device to a specific address, and once they obtain it, will send a new one back to her.

Diane and Pat McKeague have been using a Kindle since 2007 and have just recently purchased an iPad. Since they are both in book clubs and travel frequently, both devices have offered a simpler form of access to their books, while providing ease in traveling. Although they appreciate both devices, reading paper books seems to still be the prevalent method in their household. In terms of recycling, they would be more likely to do so versus keeping their older devices, yet they are unaware of how to do so.

From these interviews, I have gained more insight into how critical it is that individual usage methods are recorded in order to honestly compare the sustainability of E-readers versus printed material. Some early adapters, as exemplified above, are now inclined to read their information digitally more so than ever before. Others, on the other hand, are still getting familiar with the idea of E-readers and the possible advantages they could offer. Unfortunately however, most E-reader users are unaware of what they should do when ready to discard their devices. Not surprisingly, this is a result of companies currently unaware of what safe practices to participate in themselves. For now, the seemingly most cost efficient methods being used are also the most harmful to both workers and the environment alike. A different structure for the

reclaiming of these devices needs to be set in place to effectively aid in making technology the “greener” option. Not only should the companies, themselves, become concerned with this, but also the customers, who play a large role in what happens to their purchases after they are finished using them.

In conjunction with these personal interviews, I’ve also included a third-party interview done with a specialist currently analyzing the ecological footprint of E-readers. Raz Godelnik is the co-founder and CEO of Eco-Libris, a company working towards improving the sustainability of the book industry in the digital age. In this interview done on February 25th, 2011, he explains his point of view on the sustainability of these devices, and where they stand in comparison to print. Godelnik states, “So, usually when I’m asked if e-reading is greener than traditional reading of paper books, my reply is that it depends. It depends on the profile of the reader. If you’re an avid reader and you read many books, probably the E-reader is a greener option for you. But, if you read only a couple of books a year, it might be that paper books are still a better option when it comes to the environmental impact of your reading. So, it definitely depends, and of course, it also depends on how much time you are going to keep the E-reader that you’re having or that you’re planning to buy. Is it only for one year until the next version will be out, or is it for five years? So, there’s definitely no one answer for everyone, but it’s an individual answer for each and every reader.” (Living On Earth) This statement exemplifies exactly what has been said previously, in that the basic sustainability of E-readers has been proven to be on an individual-by-individual basis. Unfortunately, there is no simple way to test the technology, since each owner utilizes it uniquely. Mr. Godelnik did not touch on the subject of E-reader recycling practices however, but has set up a foundation in which readers and publishers can donate one dollar for every book they read and/or publish. This dollar goes towards planting

trees in areas such as Central America and Africa, where deforestation typically takes place.

Although this practice seems more suitable for making printed books greener, any way in which we replenish the environment will help in improving our sustainability.

Chapter V – Conclusions

Identifiable with most research studies of its nature, this study is subject to bias in response due to the small sample size in relation to the E-reader population at large. However, with the specialized interviews conducted and the analysis of professional opinions within the industry, the results described here can be applied to the overall deductions of E-reader sustainability.

With this technology still being fairly new, a continual monitoring of its popularity level is necessary. If the trend is such that more and more people are reading their information electronically, individuals must be meeting the specific criteria to make sure their practices are sustainable. If usage rates are not meeting the standards set in place for these devices, and they are being discarded or disused prematurely, it would be an effective measure for those individuals to reconsider their current methods.

In regards to recycling practices, it is apparent that action needs to be taken in order to reach a more sustainable and effective means of reusing these devices. Instead of exporting E-readers to third world countries to be dismantled and melted down, it is the responsibility of the manufacturing companies and the customers alike to know where these devices are going and how they can be disposed of safely.

This study has proven to explain how E-readers and printed material have both positive and negative aspects. If one is more inclined to read quickly and frequently, then purchasing an E-reader instead of print may be the route to take. Yet if one does not foresee themselves using the device with the environment in mind, then it is a more sustainable option for them to stay with printed books. In analyzing both, it is safe to state that a secure and ecologically safe

practice of recycling print has been implemented, so the same must be done for electronics. In order to make an E-reader a more environmentally sound choice, it must be green during and after its lifecycle.

Following the findings from my personal research and professional opinions, as that of Mr. Godelnik's, the ability to make an E-reader “green” clearly relies on individual responsibility. In analyzing both the Kindle and iPad's carbon footprints, it has been determined that owners need to read fifty to seventy e-books during a device's lifetime to match that of print's, which is thirty-two to forty-two paper books. With the average survey consumer reading a maximum of ten books a year, a device would need to be in regular use for five to seven years to reach this goal. In terms of water consumption efficiency, however, owners only need to read at least twelve e-books on an E-reader to become less wasteful than print. Analyzing the recycling practices set up for E-readers, it is apparent they have fallen short of beneficial. Not only are these electronics being dumped into our landfills, they are being shipped overseas, destroying and polluting the land of third world countries. With mounted confusion on how to safely get rid of these devices, an increasingly apparent routine is for people to either just hold on to them or pass them down to family and friends. Even though this can be seen as an environmentally friendly option, the E-readers will eventually be discarded and it is important we find a safe measure of doing so. Every decision to make an E-reader a sustainable alternative to print will rely on the consumer using the device. If used properly, E-readers can very much be an equal competitor to print. With all factors in mind, it is up to the individual to make the correct choices in confirming the devices' sustainability.

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